

CLAIMS

- 1 1. A method for charging and maintaining the operation of a battery-powered elec-
2 tronic application device, including the steps of:
- 3 (A) providing a controllable switching device;
- 4 (B) providing a plurality of power sources each coupled to said application
5 device via said controllable switching device, said plurality of power
6 sources including at least two of the following;
- 7 (i) an AC power source;
- 8 (ii) a DC power source;
- 9 (iii) a direct oxidation fuel cell; and
- 10 (iv) a rechargeable battery; and
- 11 (C) switching said controllable switching device to select between said plural-
12 ity of power sources to provide operating power to said application device or to charge
13 said rechargeable battery.
- 1 2. The method as defined in claim 1, including the further steps of:
- 2 (A) selecting as a primary power source, said AC power source and determin-
3 ing whether said AC power source is available; and
- 4 (B) if said AC power source is available, responsively signaling said control-
5 lable switching device to select said AC power source to power said appli-
6 cation device; and
- 7 (C) if said AC power source is not available, selecting one of said DC power
8 source, or said fuel cell, or said rechargeable battery to power said application device.
- 1 3. The method as defined in claim 1, including the further steps of:
- 2 (A) selecting as a primary power source, said AC power source and determin-
3 ing whether said AC power source is available; and
- 4 (B) if said AC power source is available, selecting said AC power source to
5 power said application device; and

6 (C) if said AC power source is not available, determining whether said DC
7 power source is available and if so, selecting said DC power source to power said appli-
8 cation device;

1 (D) if said DC power source is not available, determining whether said
2 chargeable battery is sufficiently charged to power said application device and if so, se-
3 lecting said rechargeable battery to power said application device;

4 (E) if said rechargeable battery is not sufficiently charged, responsively sig-
5 naling said direct oxidation fuel cell to begin generating electricity to provide current to
6 power said application device.

1 4. The method as defined in claim 1, including the further steps of:

2 (A) selecting as a primary power source, said DC power source and determin-
3 ing whether said DC power source is available;

4 (B) if said DC power source is available, selecting said DC power source to
5 power said application device; and

6 (C) if said DC power source is not available, selecting one of said AC power
7 source, said fuel cell, or said rechargeable battery to power said application device.

1 5. The method as defined in claim 1, including the further steps of:

2 (A) selecting as a primary power source, said fuel cell and determining
3 whether said fuel cell is available;

4 (B) if said fuel cell is available, selecting said fuel cell source to power said
5 application device; and

6 (C) if said fuel cell is not available, selecting one of said AC power source,
7 said DC power source, or said rechargeable battery to power said application device.

1 6. The method as defined in claim 1, including the further steps of:

2 (A) selecting as a primary power source, said rechargeable battery and deter-
3 mining whether said fuel cell is available;

4 (B) if said rechargeable battery is available, selecting said rechargeable battery
5 source to power said application device; and

6 (C) if said rechargeable battery is not available, selecting one of said AC
7 power source, said DC power source, or said fuel cell to power said application device.

1 7. The method as defined in claim 1 including the further steps of:
2 determining whether said rechargeable battery is fully charged; and
3 if it is determined that said rechargeable battery is not fully charged, then signal-
4 ing said AC power source, said DC power source and said fuel cell to charge said
5 rechargeable battery.

1 8. A system for powering an electronic application device, comprising:
2 (A) an input adaptable to receive power from an AC power source;
3 (B) an input adaptable to receive power from a DC power source;
4 (C) a direct oxidation fuel cell system;
5 (D) a means by which said system may be electrically connected to said elec-
6 tronic application device; (i.e. a wire; hot pads, etc)
7 (E) a switching device connected to said AC input, said DC input and said fuel
8 cell wherein said switching device is operable to select between a first state in which cur-
9 rent flows through said switching device from said AC input, a second state in which cur-
10 rent flows from said DC input and a third state in which current is drawn from said fuel
11 cell system; and
12 (F) a microprocessor coupled to said switching device and programmed to
13 select between said AC power source, said DC power source and said fuel cell system,
14 depending upon predetermined conditions.

1 9. The system for powering an application device as defined in claim 8, further
2 comprising a rechargeable battery connected to said input from said DC source, said in-
3 put from AC power source and with said fuel cell system, and said microprocessor being
4 programmed to select the rechargeable battery to power the application device if said DC
5 source and said AC source are not available.

1 10. The system as defined in claim 9, wherein said microprocessor is further pro-
2 grammed to signal one of said DC power source, AC power source and fuel cell system
3 to deliver power to charge said rechargeable battery while the application device is con-
4 nected to one of the other non-selected sources so that the battery will be charged as the
5 application device is being powered.

1 11. The system as defined in claim 8, further comprising a power combiner (?)
2 and conditioner which is adapted to perform signal processing and signal conditioning to
3 the power source selected by said microprocessor such that the power signal is compati-
4 ble with the specifications of the application device.

1 12. The system as defined in claim 8, wherein said direct oxidation fuel cell system
2 includes
3 (A) a fuel source;
4 (B) a housing;
5 (C) a direct oxidation fuel cell comprising a protonically conductive, elec-
6 tronically non-conductive membrane electrolyte having an anode aspect and a cathode
7 aspect, and a catalyst coating being disposed on the anode and the cathode aspects such
8 that when fuel is introduced to the anode aspect an anodic disassociation of the fuel into
9 carbon dioxide protons and electrons occurs and a cathodic combination of protons, elec-
10 trons and oxygen produces water whereby current is produced from the electricity gener-
11 ating reactions to provide current to a load associated with the fuel cell system.

1 13. A system for charging a rechargeable battery, comprising
2 (A) an input for receiving an AC power source;
3 (B) an input for receiving a DC power source;
4 (C) a direct oxidation fuel cell system;
5 (D) a rechargeable battery;
6 (E) a switching device operable to select between said AC power source, said
7 DC power source and said fuel cell such that the selected power source provides power to
8 charge said rechargeable battery; and

9 (F) a microprocessor programmed to direct said switching device to select
10 between the AC power source, the DC power source and the fuel cell depending upon
11 predetermined conditions.

1 14. The system as defined in claim 13 wherein the battery provides current to an
2 electrical device as it is being recharged.

1 15. The system as defined in claim 14 wherein the battery can be removed and placed
2 in an application device after it is charged.

1 16. A portable power source unit for charging and maintaining the operation of a
2 battery powered application device, comprising:

3 (A) an input for receiving an external AC power source;

4 (B) an input for receiving an external DC power source;

5 (C) a direct oxidation fuel cell system;

6 (D) a rechargeable battery;

7 (E) a switching device operable to select between said AC power source, said
8 DC power source, said fuel cell system and said rechargeable battery such that power is
9 continuously applied to said battery-powered electronic application device; and

10 (F) a modular interface having a plurality of interfaces for receiving power
11 connectors that couple the powering unit to an application device.

1 17. The powering unit as defined in claim 16, wherein said modular interface also in-
2 cludes inputs for producing signals of varying potentials that are available to power a
3 number of different application devices.

1 18. The portable power unit as defined in claim 16 wherein said DC power source is
2 an automobile DC power source.

1 19. The portable power unit as defined in claim 16 wherein said AC power source is
2 one of the following:

- 3 (A) an electrical outlet in a building or structure;
- 4 (B) a portable generator; and
- 5 (C) a power grid.

1 20. The portable power unit as defined in claim 16 wherein said application device
2 may be selected from the group consisting of:

- 3 (A) mobile phones,
- 4 (B) personal digital assistants,
- 5 (C) mobile computers,
- 6 (D) mobile DVD players, and
- 7 (E) mobile video game systems.

